ENGINEERING MATHEMATICS-I

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I

Course Code	:	17MAT11	CIE Marks	:	40
Number of Lecture Hours/Week	:	04	SEE Marks	:	60
Total Number of Lecture Hours	:	50	Exam Hours	:	03

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following:

- nth derivatives of product of two functions and polar curves.
- Partial derivatives
- Vector calculus
- Reduction formulae of integration; To solve First order differential equations.
- Solution of system of linear equations , quadratic forms.

Module - 1 **Hours - 10**

Differential Calculus -1:

Determination of nth order derivatives of Standard functions - Problems. Leibnitz's theorem (without proof) - problems.

Polar Curves - angle between the radius vector and tangent, angle between two curves, Pedal equation of polar curves. Derivative of arc length - Cartesian, Parametric and Polar forms (without proof) - problems. Curvature and Radius of Curvature – Cartesian, Parametric, Polar and Pedal forms (without proof) -problems

Module - 2 **Hours - 10**

Differential Calculus -2:

Taylor's and Maclaurin's theorems for function of one variable(statement only)- problems. Evaluation of Indeterminate forms.

Partial derivatives – Definition and simple problems, Euler's theorem(without proof) – problems, total derivatives, partial differentiation of composite functions-problems. Definition and evaluation of Jacobians

Module - 3 **Hours - 10**

Vector Calculus:

Derivative of vector valued functions, Velocity, Acceleration and related problems, Scalar and Vector point functions. Definition of Gradient, Divergence and Curl-problems. Solenoidal and Irrotational vector fields. Vector identities - div(ϕA), curl (ϕA), curl(grad ϕ), div(curl A).

Module - 4 **Hours - 10**

Integral Calculus:

Reduction formula $\int Sin^n x\,dx$, $\int Cos^n x\,dx$, $\int Sin^m x\,Cos^n x\,dx$ (m and n are positive integers), evaluation of these integrals with standard limits (0 to $\pi/2$) and problems.

Differential Equations;

Solution of first order and first degree differential equations – Exact, reducible to exact and Bernoulli's differential equations .Orthogonal trajectories in Cartesian and polar form. Simple problems on Newton's law of cooling.

Module - 5 **Hours - 10**

Linear Algebra

Rank of a matrix by elementary transformations, solution of system of linear equations - Gauss-elimination method, Gauss –Jordan method and Gauss-Seidel method.

Eigen values and Eigen vectors, Rayleigh's power method to find the largest Eigen value and the corresponding Eigen vector. Linear transformation, diagonal-isation of a square matrix . Reduction of Quadratic form to Canonical form

Course outcomes:

On completion of this course, students are able to

* Use partial derivatives to calculate rates of change of multivariate functions.
* Analyze position, velocity, and acceleration in two or three dimensions using the calculus of vector valued functions.
* Recognize and solve first-order ordinary differential equations, Newton's law of cooling
* Use matrices techniques for solving systems of linear equations in the different areas of Linear Algebra.

Question paper pattern:

* The question paper will have ten questions.
* Each full Question consisting of 20 marks
* There will be 2 full questions(with a maximum of four sub questions) from each module.

* Each full question will have sub questions covering all the topics under a module.
* The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. B.S. Grewal, **"Higher Engineering Mathematics"**, Khanna publishers, 42nd edition, 2013.
2. Erwin Kreyszig, **"Advanced Engineering Mathematics I,"** Wiley, 2013

Reference Books:

1. B.V. Ramana, "Higher Engineering Mathematics", Tata Mc Graw-Hill, 2006
2. N.P.Bali and Manish Goyal, **"A text book of Engineering mathematics"**, Laxmi publications, latest edition.
3. H.K. Dass and Er. RajnishVerma, **"Higher Engineerig Mathematics"**, S.Chand publishing, 1st edition, 2011.

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